CALIFORNIA
OCCUPATIONAL GUIDES

EDD Employment Development Department
State of California

TOOL AND DIE MAKERS

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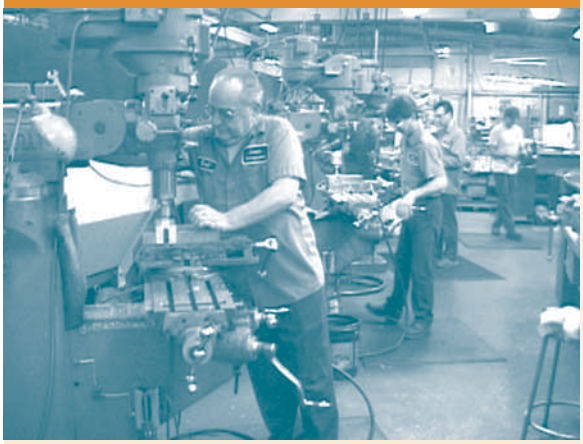
INTEREST AREA
REALISTIC



WHAT DOES A TOOL AND DIE MAKER DO?

Almost everything you touch on a daily basis has been created by metal forming–cars, doorknobs, razor blades, paper clips, shovels, beds, skateboards, and musical instrument are just a few examples. TOOL AND DIE MAKERS set up and operate the tools, dies, jigs, fixtures, and gauges used in mass production machines to manufacture identical parts made of metal or combinations of metal and other materials. Although Tool Makers and Die Makers use common tools and techniques, the resulting products differ. Tool Makers use machine tools to make jigs and fixtures that hold metal parts being shaved, stamped, or drilled. Die Makers craft metal forms, or dies, that shape metal in stamping and forging operations. Tool and die making is fundamental to the manufacturing process.

Tool and Die Makers commonly use computer-aided design (CAD) to develop products and specifications for tools and dies. The designs are then sent to computer numerically controlled (CNC) machines to produce the die. In shops that use numerically controlled (NC) machine tools, Tool and Die Makers often assist in planning and writing NC programs.

Tool and Die Makers plan and execute the entire sequence of tool and die construction from design to final machined product. They perform the following tasks:

- Study blueprints or specifications and visualize shape of die, part, or tool.
- Compute dimensions of assembly and plan sequence of operations.
- Measure, mark, and scribe metal or plastic stock to lay out machining, using instruments, such as protractors, micrometers, scribes, and rulers.
- Set up and operate machine tools, such as lathes, milling machines, shapers, and grinders, to machine parts.
- Lift, position, and secure machined parts on surface plate or worktable, using hoist, vises, v-blocks, or angle plates.
- Smooth and polish flat and contoured surfaces of parts or tools, using scrapers, abrasive stones, files, emery cloth, or power grinder.
- Design tools, jigs, fixtures, and templates for use as work aids. Cast plastic tools or parts, or tungsten-carbide cutting tips, using pre-made molds.
- Inspect die for smoothness, contour conformity, and defects by touch or visually, using loupe or microscope.

Recognized specialties for Tool and Die Makers include Die Finishers; Die Makers; Bench Stamping-Die Makers; Stamping Die Makers; Trim Die Makers; Wire Drawing Die Makers; Mold Maker Die Sinkers; Die-Casting and Plastic Molding Mold Makers; Plastic Tool Makers; Plastic-Fixture Builders; Saw

Makers; Tap-and-Die-Maker Technicians; Bench Tool Makers; Lay-Out Workers; and Electronic Die Makers.

WHAT SKILLS ARE IMPORTANT?

Tool and Die Makers are highly skilled workers. Beyond basic machinist skills, they possess extensive knowledge of the physical properties of various metals and alloys and the limits to which these materials can be shaped and worked. They also understand techniques that impart different strengths to the material being formed.

Tool and die making will appeal to those who enjoy solving practical, hands-on problems, working on their own, and making decisions. Tool and Die Makers need extreme patience and painstaking attention to detail since they must be precise to one ten-thousandth of an inch. Since the work involves intricate manipulation of tools and instruments, Tool and Die Makers need a mechanical aptitude, the ability to understand and analyze the workings of machinery, knowledge of shop mathematics, and the capacity to visualize mechanical and physical relationships between objects.

Important skills, knowledge, and abilities for Tool and Die Makers include:

- Mechanical – Knowledge of machines and tools, including their designs, uses, repair, and maintenance.
- Production and Processing – Knowledge of raw materials, production processes, quality control, costs, and other techniques for maximizing the effective manufacture and distribution of goods.
- Operation and Control – Controlling operations of equipment or systems.
- Equipment Selection – Determining the kind of tools and equipment needed to do a job.
- Control Precision – The ability to quickly and repeatedly adjust the controls of a machine or a vehicle to exact positions.
- Near Vision – The ability to see details at close range (within a few feet of the observer).
- Manual Dexterity – The ability to quickly move your hand, your hand together with your arm, or your two hands to grasp, manipulate, or assemble objects.
- Wrist-Finger Speed – The ability to make fast, simple, repeated movements of the fingers, hands, and wrists.
- Computer – Knowledge of computer hardware and software, including applications and programming.

WHAT'S THE WORK ENVIRONMENT?

Most Tool and Die Makers work either in large manufacturing plants or in contract shops that specialize in making tools and dies. These firms are concentrated in urban areas. Work spaces are relatively pleasant and generally quieter and cleaner than production machine shops. Some moderately heavy lifting is involved. As with any use of hand or power tools, injury is possible, but the work is generally safe for those who take reasonable care, use protective equipment, and adhere to safety rules.

Union Membership

Tool and Die Makers could belong to a variety of unions, such as the International Association of Machinists or the United Auto Workers, depending on the industry and employer.

WHAT'S THE CALIFORNIA JOB OUTLOOK?

The following information is from the occupational projections produced by the Employment Development Department (EDD) Labor Market Information Division (LMID):

Tool and Die Makers

Estimated number of workers in 2002:	4,500
Estimated number of workers in 2012:	4,600
Projected Growth 2002-2012:	2.2%
Est. openings due to separations by 2012:	1,000

These figures do not include self-employment.

This occupation will grow slower than average compared with all occupations in California. There will be an average of 190 job opportunities per year in this occupation from 2000 through 2010. New products and changing product designs require new tools and dies, which has historically assured employment of Tool and Die Makers. The

growth rate has slowed as recent improvement in the machines that Tool and Die Makers use boost the productivity of each worker.

Tool and Die Makers usually enjoy considerable job security even during hard times. Employers are reluctant to lay them off because their skills represent an investment in years of expensive training.

Trends

In some industries, the number of products that use parts machined by Tool and Die Makers has been reduced because of the use of electronically controlled machine tools. Manufacturers continue to experience a shortage of qualified experienced and inexperienced Tool and Die Makers despite the use of NC machine tools and the increased importation of finished goods and precision metal products.

WHAT DOES THE JOB PAY?

California Earnings

The following information is from the Occupational Employment Statistics Survey of Employers by EDD/LMID:

Tool and Die Makers 2005 Wages

Hourly wages range from	$15.56	to	$26.23
Average hourly wage	$21.06		
Average annual wage	$43,802		

These figures do not include self-employment.

Tool and Die Makers can earn as little as minimum wage when starting out to as much as $26.48 an hour as journey-level workers. Wages also vary from firm to firm.

Hours

The standard workweek is Monday through Friday. Overtime, if required, is compensated at 1-1/2 times the basic rate; Sunday and holiday work is paid at twice the basic rate. The average workweek for toolmakers is 45-55 hours.

Benefits

Employer benefits typically offered include sick leave, vacation, medical and dental care, and retirement plans.

HOW DO I PREPARE FOR THE JOB?

Education and Training

Tool and Die Makers undergo extensive training to perform the complex tasks necessary in the trade. They acquire these skills in one or a combination of three ways: a formal apprenticeship, vocational school, or on-the-job training.

Training in the four-year apprenticeship program is spent mostly in the shop and on the job. Apprentices learn to operate hand and power tools, and other mechanical equipment. They also study heat-treating and other metal working processes. In addition to shop work, apprentices receive on an average of 144 hours per year of classroom instruction in mathematics, mechanical drawing, tool designing, CAD, tool programming, and blueprint reading.

Many community colleges offer manufacturing technology and machine shop certificates or degrees. Some community colleges offer tool design technology courses. Programs accredited by the National Institute for Metalworking Skills (NIMS) are listed at their Web site.

On-the-job training is another way Tool and Die Makers learn the trade. On-the-job training is generally not as thorough and may take longer than an apprenticeship program as there is no formally planned schedule of work experience and related training.

Licensing and Certification

Competency specific credentials are available through the National Institute for Metalworking Skills.

Continuing Education

Although Tool and Die Makers do not have formal continuing education requirements, they need to keep up with new technologies. Acquiring the credentials offered through National Institute for Metalworking Skills ensures portable skills for Tool and Die Makers.

HOW DO I FIND THE JOB?

Candidates for training or apprenticeship programs should apply directly to employers who employ Tool and Die Makers. Community colleges offer assistance in finding jobs to graduates of degree or certificate programs in tool and die making or machine shop. Unions representing Tool and Die Makers also have information concerning apprenticeships and related matters.

Direct application to employers remains one of the most effective job search methods. Most Tool and Die Makers in California are employed in the following industries.

- Metalworking Machinery
- Metal Forgings and Stampings
- Aircraft and Parts
- Screw Machine Products, Bolts
- Plastic Products
- Industrial Machinery
- Electronic Components and Accessories
- Medical Instruments and Supplies
- Electric Lighting and Wiring Equipment
- Cutlery, Hand Tools, and General Hardware
- Motor Vehicles and Equipment

Search these **yellow page** headings for listings of private firms:

- Die Makers
- Tool Designers
- Plastic Fabricators
- Sheet Metal Work
- Metal Fabricators
- Metal Cutting Tools
- Metal Stamping
- Metal Rolling and Forming
- Metal Spinning
- Metal Straightening
- Metal Castings

The following Internet resources can be helpful to the job search process:

America's Career InfoNet
www.acinet.org

America's Job Bank
www.ajb.dni.us

CalJOBS℠
www.caljobs.ca.gov

Job Search and Resume Writing
www.worksmart.ca.gov/success_tips_menu.html

Local Job Service Offices
www.edd.ca.gov/jsrep/jsloc.htm

Occupational Information Network (O*NET) Online
http://online.onetcenter.org

One-Stop Career Centers List
www.edd.ca.gov/ONE-STOP/pic.htm

For statewide and local projections, wages, employers by county, and other occupational information go to www.labormarketinfo.edd.ca.gov and select *Find an Occupation Profile*.

WHERE CAN THE JOB LEAD?

Tool and Die Maker training does not necessarily end with the attainment of journey-level status. They must constantly refine their techniques to keep pace with changing designs, materials, and technologies. The more skilled and knowledgeable they become, the more valuable they are to their company, and the higher the salary they can earn. Some specialized tasks are quite complicated and may take several years to learn.

Skilled Tool and Die Makers may advance to tool inspectors, lead persons, or supervisors. Tool design and programming are also possibilities, as are management positions with the company. Some Tool and Die Makers start their own businesses.

OTHER SOURCES OF INFORMATION

International Association of Machinists and
Aerospace Workers
9000 Machinists Place
Upper Marlboro, MD 20772-2687
(301) 967-4500
www.iamaw.org

The National Institute for Metalworking Skills
3251 Old Lee Highway, Suite 205
Fairfax, VA 22030
(703) 352-4971
www.nims-skills.org/home/index.htm

National Tooling and Metalworking Association
9300 Livingston Road
Ft. Washington, MD 20744
www.ntma.org

PMA Educational Foundation
6363 Oak Tree Boulevard
Independence, OH 44131-3292
www.pmaef.org/occupations/index.htm

Precision Machine Products Association
6700 West Snowville Road
Brecksville, OH 44141-3292
www.pmpa.org

CA Division of Apprenticeship Standards
For the closest district office, visit
www.dir.ca.gov/DAS/das.html

RELATED OCCUPATIONAL GUIDES

Mechanical Engineers	No. 5
Machinists and Numerical Control Tool Programmers	No. 9
Metal Workers, Fabrication and Structural	No. 112

OCCUPATIONAL CODE REFERENCES

SOC *(Standard Occupational Classification)*
Tool and Die Makers 51-4111

O*NET *(Occupational Information Network)*
Tool and Die Makers 51-4111.00

OES *(Occupational Employment Statistics)*
Tool and Die Makers 89102